Claims

1. A magnetic resonance imaging apparatus comprising a transmitting means for applying an RF magnetic field to a subject placed in a static magnetic field, an RF irradiation control means for controlling irradiation phase of the RF magnetic field, a receiving means for detecting nuclear magnetic resonance signals generated from the subject, a control means for controlling the transmitting means, the RF irradiation control means and the receiving means, and an image formation means for reconstructing an image of the subject by using the nuclear magnetic resonance signals,

wherein the RF irradiation control means controls RF irradiation so that the RF pulse should be applied with a phase of the second half of the RF pulse waveform after the center thereof different by 180° from the phase of the first half of the RF pulse waveform.

2. The magnetic resonance imaging apparatus according to claim 1,

wherein the transmitting means is provided with a multiple array transmitting coil comprising multiple coils of different sensitivity profiles, and the RF irradiation control means performs such phase control for a part of the multiple coils that the phase of the second half of the RF pulse waveform after the center thereof should be different by 180° from the phase of the first half of the RF pulse waveform.

3. The magnetic resonance imaging apparatus according to claim 2,

wherein the multiple array transmitting coil is provided with

a loop coil and at least one differential coil,

the differential coil is provided with multiple subloop coils,

the multiple subloop coils and the loop coil have a common central axis, the subloop coils are plane-symmetrically disposed around the loop coil as the center, and

the subloop coils constituting the same differential coil are connected so that currents should flow through a pair of plane-symmetrically disposed subloop coils in different directions.

4. The magnetic resonance imaging apparatus according to claim 3,

wherein the differential coil is provided with a primary differential coil and a secondary differential coil,

the subloop coils of the primary differential coil are disposed so that the loop coil should locate between the subloop coils of the primary differential coil, and

the subloop coils of the secondary differential coil are disposed so that the loop coil and the subloop coils of the primary differential coil should locate between the subloop coils of the secondary differential coil.

5. The magnetic resonance imaging apparatus according to claim 2,

wherein the transmitting means is provided with, as transmitting coils,

a first multiple array transmitting coil comprising a first loop coil and at least one differential coil having a common central axis and a second multiple array transmitting coil comprising a second loop coil and at least one differential coil having a common central axis, and

the central axes of the first and second multiple array transmitting coil are perpendicular to each other.

6. The magnetic resonance imaging apparatus according to claim 3 or 5,

wherein the loop coil comprises plane-symmetrically disposed multiple loop coils.

7. The magnetic resonance imaging apparatus according to claim 3 or 5,

wherein the RF irradiation control means performs such phase control for the differential coil among the multiple coils that the phase of the second half of the RF pulse waveform after the center thereof should be different by 180° from the phase of the first half of the RF pulse waveform.

8. The magnetic resonance imaging apparatus according to claim 7,

wherein the RF irradiation control means performs such phase control for the differential coil that the phase should be inverse in two times of measurement, and the image formation means adds nuclear magnetic resonance signals obtained by two times of the measurement to reconstruct one image.

9. The magnetic resonance imaging apparatus according to claim 1 or 8,

wherein the control means performs selective excitation for the slice direction upon excitation by application of the RF magnetic field.

10. The magnetic resonance imaging apparatus according to claim 1 or 8,

wherein the control means performs selective excitation for the phase encoding direction or frequency encoding direction upon excitation by application of the RF magnetic field.

11. The magnetic resonance imaging apparatus according to claim 3 or 5,

wherein the multiple array transmitting coil is used also as an RF receiving coil of the receiving means.

12. The magnetic resonance imaging apparatus according to claim 11,

wherein the control means performs imaging with thinning

out the phase encoding, and when an image is reconstructed by using nuclear magnetic resonance signals detected by each of the coils of the multiple array transmitting coil, the image formation means performs an anti-aliasing operation by using sensitivity profile of each of the coils constituting the multiple array transmitting coil.

13. The magnetic resonance imaging apparatus according to claim 11,

wherein the image formation means composes images reconstructed by using nuclear magnetic resonance signals detected by each of the coils of the multiple array transmitting coil to produce one image.